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Improving the US Army's Furnishing Management Process using the Lean Six Sigma Methodology

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Improving the US Army's Furnishing Management Process using the Lean Six Sigma Methodology

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Report

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To my wife, Jennifer, and my children;

Angel, Andrew, and Brooklyn.

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Improving the US Army's Furnishing Management Process using the Lean Six Sigma Methodology

by

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The University of Texas at Austin, 2013

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This report describes the major steps used in the Army's LSS methodology, provides a brief overview of the Unaccompanied Personnel Housing and the Army Family Housing and briefly describes some of the initial steps intended to start improving the process. In the improvement phase, two detailed models (The EOQ Model and the Hadley and Whitin (Q,r) Model) used for inventory management are discussed. This report also provides a series of recommendations that include suggestions for baseline inventory levels, some ideas for future data collection, example improvements to some data input sheets as well as a few tasks for UPH and AFH managers to reduce cost and improve the overall efficiency of the system.

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INTRODUCTION

One of the most critical problems the United States Government faces today is its expanding national debt and defense spending is a major component of the national debt. Although there are numerous factors that contribute to defense spending, many programs and organizations are committed to using government funds in the most efficient way possible. One of these programs is the US Army's Lean Six Sigma (LSS) Program. Starting in 2006, the Army's LSS Program has saved the Army approximately $19.1 billion dollars yielding a return on investment of approximately 700 to 1 (Stand To, 2011). As a result of this success, the Army has diligently trained personnel throughout the force to use the LSS process improvement methodology with the ultimate goal of successfully employing the program throughout the entire organization.

A specific focus of the LSS Program is the Furnishings Management Process associated with the Unaccompanied Personnel Housing (UPH) and Army Family Housing (AFH). Since 2006, UPH and AFH managers have deviated from the Army's Installation Management Command (IMCOM) Furnishings Management Process, creating significant inconsistencies and variabilities across Army installations world-wide resulting in unfunded requests (UFRs) in excess of $20 million dollars in FY 2011. The current processes' path is unsustainable. Significant changes must be made to protect the long-term viability of the process. In order to make the necessary changes to the Furnishings Management Process the following elements must be analyzed: 1) Requirement determination and procurement, 2) Inventory management and replacement, and 3) Storage, transportation and disposal.

This report will describe the major steps used in the Army's LSS methodology and provide a brief overview of the UPH and AFH and will briefly describe some of the initial steps intended to start improving the process. In the improve phase, two detailed models used for inventory management will be presented and a series of calculations will be executed in order to show the strengths and weaknesses of the models. This report will also provide a series of recommendations that will include suggestions for baseline inventory levels, some ideas for future data collection, example improvements to some data input sheets as well as a few tasks for UPH and AFH managers to reduce cost and improve the overall efficiency of the system.

PROBLEM DEFINITION

The original project for improving the Furnishings Management Process was commissioned in 2009. The Furnishings Management Process is the process installation managers use to procure, distribute, maintain, replace, and dispose of furniture and appliances. The Furnishings and Management Process is used at every installation world-wide as a process to minimize the cost the Army spends in order to meet the housing and furniture requirements of its customers. The overall process tracks and maintains a variety of items to include furniture, appliances, etc. Initially, the Furnishings Management Process project was divided into three sub-groups: 1) UPH, 2) AFH, and 3) General Officers' Quarters. IMCOM assigned various Army LSS qualified personnel to various aspects of the project. They immediately began to "Define" the problem, the Army's first phase in the LSS methodology. The overall goal for the entire project was to gain control of a very large and expensive program that was responsible for a growing number of unfunded requests. IMCOM believed that one of the main reasons for the growing number of UFRs was the inability of installation managers to accurately perform any inventory management. When asked, most installation managers could not specify the amount of storage space they had available and they also could not estimate the average holding cost for a particular item. Additionally, IMCOM noted a significant lack of standardization across the 70 installations that are under its current command. Finally, IMCOM was experiencing some lifecycle issues when it came to certain types of furniture. In some cases, installations were both over-extending the lifecycle of certain

items and approving the purchase of unauthorized items. In short, IMCOM needed to fix the Furnishings Management Process as soon as possible.

During the "Define" phase of the project, many of the originally assigned project personnel were either transferred or dismissed. This unusually high amount of personnel turnover caused the project to be deferred for approximately six months during which LSS qualified personnel were assigned to complete the project. Subsequently, the new project teams completed the Define Phase and the Measure Phase. In 2012, IMCOM incurred a reprioritization of workloads, and the project was again deferred just as the Analyze Phase had begun. The project then sat idle with no one doing anything worthwhile on any portion of the project. The final work that was done was some brief data compilation as well as some brief analyses.

In early January 2013, Colonel Donna Korycinski, Academy Professor at the United States Military Academy, introduced the author to Mrs. Diane Talbot, a LSS Black Belt at IMCOM in San Antonio, Texas, and Mrs. Talbot introduced the author to the AFH/UPH Furnishings Management Process improvement project. She gave the author a detailed introduction and access to all of the work that had been accomplished to date as well as all of the data that had been collected. The author was then asked to conduct some analyses towards finding ways to improve the entire project. The initial tasks were to improve the data gathering process as well as to provide some examples models that could be used to improve inventory management. The following sections describe, in detail, the Furnishings Management Process and provide a detailed explanation of two of the models recommended for use in order to improve that process.

DEFINE

The first step in understanding the Furnishings Management Process is to describe the current system used by the associated managers. IMCOM LSS personnel used the Define phase to brainstorm and collaborate in an attempt to understand the entire problem and issues currently present. In Define, IMCOM developed the problem statement, determined the overall goal and narrowed the scope of the project. IMCOM will address the project in one of two ways: 1) The project will be labeled a multigenerational project or 2) The project will be assigned sufficient LSS qualified personnel to work on the varying aspects of the project. Their main goal is to ensure that everyone involved is synchronized and that all of the smaller projects are working together as one, much larger project.

It is important to note that there are significant differences in the system used at any of the different installation locations. Regardless of these differences, there is a general process that is followed by the Furnishings Management Process for UPH and AFH across the entire Army. First, furniture is procured at some level within the system. The procurement process can be fulfilled by large contracts that are awarded at the Department of the Army level or by smaller purchases made by individual units at the user level in order to meet a specific demand or requirement. From here the furniture is either stored at a central location or immediately transported to the end user. Next, the furniture is utilized until it is damaged, broken, or replaced by the installation management team. From this point, the furniture is either transported to a disposal location or it is removed from the system in a method that varies with each location.

These methods may include end of a lifecycle considerations or the managers may simply conclude that the item was not meeting the customer's needs. The last step in the Furnishings Management Process involves the installation managers requesting a new replacement for the furniture that has been removed from the system or making a request to meet a new or unforeseen customer demand.

The critical customer requirements are: 1) Quality furniture that is durable and aesthetically pleasing, and 2) Timely service and delivery. Although the customer is often concerned with numerous issues when it comes to UPH/AFH, they ultimately just want good, reliable furniture that is present in their housing units immediately upon their arrival to their new installation. In addition, customers expect the shortest possible wait times to fix or replace any issues they may have with any of the items in their housing units. As a result, it is imperative for installation management teams to have sufficient inventory on-hand to replace any broken furniture as well as maintenance teams that can quickly address items that can be fixed or refurbished.

In order to improve the Furnishings Management Process, IMCOM must identify the differences between the various installations and see how their individual processes affect the entire system. In the end, IMCOM's goal is to reduce the differences in practice between the different locations while simultaneously improving the way they: 1) Procure inventory, 2) Manage their inventory levels, 3) Provide service to their customers, 4) Gather and analyze information, and 5) Accurately order or request new inventory. Each installation should be able to function in a fiscally responsible way while simultaneously being able to meet the needs and demands of its customers. Installation managers should

be able to accurately forecast customer needs in accordance with a specific budget, and the ultimate goal should be to minimize and eventually eliminate UFRs.

MEASURE

The Measure Phase begins with data collection. IMCOM LSS personnel used a simple template that allows the workers to easily stratify the data, identify the data source and decide when and how to collect the data.

Once the data is collected, IMCOM personnel determine if the measurement system is valid using a Gage Repeatability & Reproducibility Chart (Continuous data) or the kappa or Kendall's statistic (Attribute data). IMCOM LSS personnel also require a detailed process map and/or value stream map, visual tools that depict flow of materials and/or information in a process where the goal is to bring value to the customer. These maps can be used to quickly identify inefficiencies and institute fast and easy fixes. Once the data collection is planned, the data is collected and the data is deemed valid, the LSS personnel determine the baseline statistics for the problem. This process also includes LSS personnel checking for the appropriate distribution that fits the data collected as well as using Pareto charts to help determine the most important functions and/or attributes that are essential to the success of the entire system.

One way to accurately compare different installations' performances is to develop quantifiable measures that may be used to evaluate each installation's overall performance. For the purposes of the Furnishings Management Process, IMCOM chose to collect numerical data on inventory, unit housing cost, procurement and contract, and disposal. In addition to numerical data, a written questionnaire was distributed to the selected installations in order to identify any trends that might be associated with the

numerical analysis. These questions include such items as how often inventories are conducted and who is responsible for repairing any of the damaged items.

In order to measure inventory compliance, installations were asked to list the items they currently had in their inventories. This list of items was then compared to the standard common table of allowances (CTA) for their particular region of the world. The CTA is a list of allowable items that is derived and maintained at the Department of the Army level. There are several regulations that describe the types of items that may or may not be used in UPH and AFH. In addition to inventory compliance, IMCOM also asked for the overall inventory cost as well as any storage cost associated with keeping excess items in temporary or long-term storage. These figures were designed to compare the prices for various items as well as to compare the storage costs from installation to installation.

In order to determine the unit housing cost, installations were asked to take their itemized list of furniture and appliances per unit housing and sum the monetary value of these items. The total monetary value would enable consistent comparisons of the total housing unit cost from one installation to another. Additionally, the differences between these total figures would be used to compare common items against each other as well as determine if there was a significant difference in the value of items across locations.

In order to determine the procurement and contract money spent per number of customers served, installations were asked to provide the total amount of money they spent in a certain fiscal year and compare it to the total number of customers they actually served. This data would then be used to determine the relative efficiency of a particular

installation. In addition to this information, installations were also asked to provide data on the lifecycle of furniture and appliances as well as any information on defects or other issues that could be quantified so that further analysis could be conducted. The data requested is detailed in Appendix A- Housings Furnishings Report.

In addition to the numerical data listed above, IMCOM also directed installation managers to provide numerical data on the initial and replacement cost of furniture and appliances as well a detailed summary of customer damage and reimbursement activities. These customer damage and reimbursement activities included the following: 1) Report of Survey (DA Form 4697), 2) Financial Liability Investigation of Property Loss (DD Form 200), 3) Statement of Charges/Cash Collection Voucher (DD Form 362) and 4) Pay Adjustment Authorization (DD Form 139). The primary reason for collecting these data was to compare the costs of initial and replacement items among the installations as well as to provide IMCOM with an understanding of how the items were being maintained by the installations themselves. The numerical data would show each of the installation managers how their internal processes compared to other installations as well as provide IMCOM with an overall picture of how funds were being spent and forecasted by the installations themselves. The Replacement/Initial Issue Cost Sheet is in Appendix B.

The last item IMCOM used to measure the performance of the installations was a questionnaire which is detailed in Appendix C-Survey Questions. The questions included the following: 1) How often does the installation update its hand receipts (a paper record documenting an item that has been issued to a customer); 2) Are all furnishings being turned-in through the Defense Reutilization and Marketing Office (DRMO)?; 3) For

whatever reason, are serviceable furnishings being turned into DRMO in lieu of warehousing?; and 4) Is there adequate warehouse space?. These questions were used by IMCOM to aid in determining the process each installation used to procure its inventory, distribute its inventory to its customers, maintain and account for the inventory that was being used, and ultimately dispose of and reorder any new inventory that was needed by the installation.

ANALYZE

Once all of the installations met the data requirements presented by IMCOM, the project goals were to determine any trends and to identify and develop any processes that would improve the entire system. The Housing Furnishings Report, the Replacement/Initial Issue Cost Sheet and the Survey Questions became the focus of the entire project, with the primary focus being the Housing Furnishings Report.

The Housing Furnishings Report was constructed to provide IMCOM with critical information on (1) the average cost, storage cost and compliance associated with numerous items, (2) how the procurement cost and contract money varied from year to year and (3) how installation managers forecasted inventory requests. Although each of the installations received the same form with detailed instructions on how it should be completed, the quality of performance in the form completion varied dramatically over the complete set of installations.

Fourteen of the 70 installations were selected, primarily based on size, to respond to the data requests. The differing levels of performance in completing the Housing and Furnishings Report were so inconsistent between those installations that no meaningful analysis was possible. For example, in Part I, Section B, the Housings and Furnishings Report asks installations to provide their annual operating budget data. This information is required for eight different cost accounts for the previous and current years as well as an estimate for the next four fiscal years.

Only 4 of the 14 responders successfully completed all required data fields. This profoundly inferior response rendered any meaningful analysis impossible.

A lack of standardization was also clearly visible in Part I, Section C (Current Inventory Status) of the Housings and Furnishings Report. In that section, managers were asked to provide data corresponding to all of the items allocated in the UPH and AFH programs on their installation. If there was any question as to how to describe a particular item, managers were asked to reference the CTA for their region that detailed exactly what the customer was allowed. Among the responders, no consistent naming convention or numbering system was used. This prohibited IMCOM personnel from comparing the furnishings located at the responding installations. In addition to not being able to compare the furnishings listed, the majority of the 14 managers cited shortages throughout their entire system and did not give IMCOM a clear picture of the on-hand inventory located at most of the installations. As a result, IMCOM was presented with data that made most of the installations appear to have inadequate inventory.

The Replacement/Initial Issue Cost Sheet was given to the installations in order to provide IMCOM with a summary of the monetary transactions that had occurred with replacement and initial issue furnishings over a period of 6 fiscal years (FY06-FY11). The data was broken down into two different categories with the managers responsible for detailing the original funding requirement as well as specifically listing who was responsible for providing the corresponding monetary support. Similar to the annual budget requirements in the previous section, only 3 of the 14 installations provided the required information, while 3 additional installations provided incomplete data for at least one of the fiscal periods in question. As a result, no useful analysis could be conducted, and IMCOM was again unable to produce any actionable recommendations.

The Survey Questions were given to the 14 installation managers in order to provide IMCOM with a detailed description of the Furnishings Management Process used at each installation. This information would be used to provide some insight into the internal process at each location and identify any trends that may be useful to helping the entire system perform in a more efficient manner. Of the 14 installations that were asked to complete the questionnaire, all 14 of the managers successfully provided all of the necessary requirements. As a result, the Survey Questions provided IMCOM with the most complete description of the Furnishings Management Process across the 14 responding installations as well as the best opportunity to make recommended changes to improve the overall efficiency at that subset of installations.

The first significant finding of the Survey Questions was that all of the responding installations properly obligated their furnishings funds against the correct Army Program Element (APE). This means that each of the managers knew the proper process to procure their UPH and AFH furnishings from the correct funding source. Only a few of the managers reported rare occasions of using the wrong APE in order to obtain certain fixtures and real property that they were unable to acquire through an alternate means. Additionally, the majority of 14 installation managers stated that all excess inventory was properly accounted for and reported to the appropriate headquarters. This statement directly *contradicted* the numerical finding in the Housings and Furnishings Report that showed the vast majority of managers did not have any excess inventory.

The Survey Questions also confirmed that all of the responding installations have a system in place that inspects all of the furnishings before they are turned-in to their

local DRMO. None of the installations turn-in furnishings that are still serviceable and for the most part, even serviceable parts of furnishings that are broken or destroyed are kept on-hand and used for replacement parts. The majority of the 14 managers also reported having all of the items they needed for their respective jobs and most installations confirmed the ability to perform simple, routine maintenance internally within their respective organizations. In general, for the 14 installations, the Furnishings Management Process seems to do a good job utilizing its on-hand inventory as well as providing the best possible furnishings to all of its customers.

The Survey Questions did in fact identify some issues that may ultimately impact the performance of the entire system. The first potential problem identified from the questionnaire was the inconsistent methods that the 14 installation managers used to update the hand receipts of the furnishings issued to their customers. Across all 14 installations, various managers employed different strategies for maintaining hand receipts, updating hand receipts, and conducting monthly and cyclic inventories. It was impossible to use the answers in the questionnaire to determine how many of the installations were conducting proper inventories. Furthermore, over 50% of the installation managers reported not having a method or system in place for projecting the amount of furnishings that were going to be turned in to their respective DRMOs in the current or upcoming fiscal year. This data supports the previous assertion that most of the installations have consistently failed to accurately forecast their future needs.

The Survey Questions also identified inconsistencies in the amount of storage space available at each of the installations. Some of the managers reported having

sufficient space for storing excess inventory, while others reported not having enough storage space to maintain even a 10% service stock level. The differences in storage space amongst the installations are an issue that must be accounted for before any major policy changes are implemented across the entire system. Additional inconsistencies that were found in the questionnaire included a varying ability to fix broken furnishings as well as an inconsistency in the quality of the furnishings that are available at each of the installations. This finding is supported by the previous findings in the Housings and Furnishings Report. The type and quality of the furnishings at each of the installations is different, and as a result, their lifecycles and planning horizons are different.

IMPROVE

The Improve Phase is critical to the LSS methodology. In this phase, LSS qualified personnel recommend their suggested improvements and give additional guidance to improve a particular process. If it is not possible to pilot a program, IMCOM uses simulations to replicate the program and to build the "to be" process maps, finalize any risk assessments and identify any risk mitigation factors.

For the UPH/AFH project, the most important thing that can be done in the Furnishings Management Process is to improve the collection of the data from the installation managers. It is very clear that the analysis needed in order to make meaningful changes to the entire system has not yet been achieved. This does not mean that the work and time invested in the project to this point have been without value; rather, it means that the inputs needed in order to conduct a through analysis have now been clearly identified. It is imperative that the actions recommended in this phase of the LSS process be implemented so that the entire process can improve its overall quality of service as well as its efficiency.

The performance measures identified in the measure phase of this project are very beneficial to understanding how the entire system operates across all of the different installations. In order to gather the desired inputs from the installation managers, IMCOM must clearly communicate to its subordinates the exact data it needs for this project as well as provide an example format for how the data should look once it is completed. In order to achieve this goal IMOCM has two viable options. First, it can populate the formatted documents with sample data in the proper format and/or it can

provide an example data submission packet from one of the installation managers from the first submission. The two best examples of complete data from the first submission were from 1) Hawaii or 2) Joint Base Lewis-McChord.

The most important data input that must be clearly explained to the installation managers, is the methodology that will be used to describe the furnishings in the Housing and Furnishings report. IMCOM must clearly explain to each of the managers exactly how to name each of the furnishings it lists in its report. The easiest way to accomplish this task is to instruct the installation managers that the only allowed description that can be used to identify an item must come from their region's corresponding CTA. If there are multiple types of the same item listed in the CTA on-hand at an installation, managers must be sure to enter the correct price for each of the items in order to help IMCOM differentiate between the different types of items listed. In addition to the data already required in the Housing and Furnishings Report, IMCOM should add a column for the installation managers to input the average lifecycle that has been observed for each of the items at their specific installation. This information could help IMCOM identify vendors that should or should not be used when filling future government contracts.

In conjunction with the above recommendations, IMCOM should consider implementing some version of the Army's Property Book Unit Supply Enhanced (PBUSE) system to track and maintain furnishings at all the installations across the Army. Similar to PBUSE, IMCOM should develop a computerized system, standard across every installation that tracks and maintains all of the furnishings in the Army. A system, similar to PBUSE, would allow IMCOM to monitor all of the furnishings at each

of the installations as well as provide a standardized tool for each of the installation managers to use. This tool would help managers with maintaining property accountability, forecasting future requirements, meeting current requirements and identifying items that are at or near the end of their lifecycle. A standard computerized system will help the Furnishings Management Process improve accountability throughout the Army. Such a system would also provide IMCOM with an accurate system to forecast future requirements and cross-level any excess inventory.

Another recommendation to consider is changing the way UPH and AFH are viewed in the context of the problem. It is clear that the most general attribute for any changes that should be made to the Furnishings Management Process involve standardization at some level. The need for standardization is present throughout the majority of the potential problems in the process. In addition, IMCOM must consider dividing their subordinate installations into two larger categories. These two categories are installations in the continental United States (CONUS) and installations outside of the continental United States (OCONUS). Furthermore, IMCOM should focus its efforts on improving UPH in both CONUS and OCONUS installations, and AFH in just OCONUS installations. Although this differentiation does not seem to significantly impact the process that is currently in place, looking at the Furnishings Management Process from the perspective of CONUS and OCONUS installations will ultimately lead to better recommendations for the corresponding installations. Instead of simply trying to standardize across the entire system worldwide, standardization for CONUS and

OCONUS installations is a better way to make the most effective changes for the entire process.

IMCOM should revise its Survey Questionnaire. The questionnaire should ask more specific questions. IMCOM should not allow the installation managers to answer only subjectively; rather each of the questions should be stated in such a way that the first part of any answer is directly quantifiable. In addition, IMCOM should consider gathering input data from DRMO. This data could be used to validate the data inputs of the installation managers.

The final recommendation considered herein is the amount of on-hand inventory or service stock each installation should have. Based on the Survey Questions, it is clear that the amount of storage space available to the installation managers differs by installation. As a result, a general guideline that should be used is that no location should have more than a 10% overage of any one particular furnishing. If an installation possesses more than the allowed 10%, the installation managers are required to turn in the excess amount and the items will then be redistributed as necessary. If an installation is unable to keep 10% of all of their on-hand furnishings, they are then required to prioritize their storage space for the furnishings that have the highest demand rates and/or the furnishings that have the longest lead times to acquire. As a result of this recommendation, installation managers are highly encouraged to use an applicable form of the economic order quantity (EOQ) Model (Harris, 1913) and the (Q,r) Model (Factory Physics, 2008) to determine appropriate on-hand quantities, safety stock levels and any necessary reorder points. If this capability is not currently available, IMCOM should

consider training installation managers on the basics of the EOQ Model and the Hadley and Whitin iterative (Q,r) Model. IMCOM can demonstrate and teach how the formulas relate to the lead times of various furnishings as well as how it is used to determine future order quantities, reorder points, and appropriate safety stock levels.

IMPROVE- THE EOQ MODEL

The EOQ Model was first presented in 1913 by Ford W. Harris (Harris 1913) and serves as one of the first applications of mathematics to inventory and factory management. The model's primary purpose is to provide a tool for inventory and property managers to use in order to determine appropriate manufacturing lot sizes. Harris's original motivation for deriving the model was precisely "How Many Parts to Make at Once." In his original paper he states:

> Interest on capital tied up in wages, material and overhead sets a maximum limit to the quantity of parts which can be profitably manufactured at one time; "set up" costs on the job fix the minimum. Experience has shown one manager a way to determine the economical size of lots.

Another way to describe the usefulness of the EOQ Model is that it is a model used by managers to determine how many items (or pieces of furniture) need to be ordered at any one time. This is important because it provides managers with the optimum order amount for any one particular item (or piece of furniture). The following assumptions are made when using the EOQ Model:

1. *Production is instantaneous*. There is no capacity constraint, and the entire lot is produced simultaneously.
2. *Delivery is immediate*. There is no time lag between production and availability to satisfy demand.
3. *Demand is deterministic*. There is no uncertainty about the quantity or timing of demand.
4. *Demand is constant over time*. In fact, it can be represented as a straight line, so that if annual demand is 365 units, this translates to a daily demand of one unit.
5. *A production run incurs a fixed setup cost*. Regardless of the size of the lot or the status of the factory, the setup cost is the same.
6. *Products can be analyzed individually*. Either there is only a single product or there are no interactions between products. (Factory Physics, 2008)

The following table provides the notation used for the EOQ model as presented in the 3rd Edition of *Factory Physics* (2008).

TABLE 1- EOQ MODEL NOTATION

SYMBOL	**INTERPRETATION**
D	Demand rate (in units per year)
c	Unit production cost, not counting setup or inventory costs (in dollars per unit);
A	Fixed ordering cost to purchase a lot (in dollars)
h	Holding cost (in dollars per unit per year); if the holding cost consists entirely of interest on money tied up in inventory, then h= ic, where i is the annual interest rate
Q	Lot size (in units); this is the decision variable

In order to use the EOQ Model, input data must be available for each installation. The data should reflect as accurately as possible the current situation at each of the different installations. As previously mentioned, one of the recommendations for IMCOM is to make changes to the Housing and Furnishings Report. Although the Housings and Furnishings Report asks for input data that is useful to conduct a variety of analyses, it does not provide the required data in order to be able to utilize the EOQ Model.

The Housing and Furnishings Report does not sufficiently standardize the naming convention of the items within the report. One way to standardize the naming convention is to use the CTA for the specific type of housing (UPH or AFH) and its corresponding

location (CONUS or OCONUS). IMCOM can further standardize the Housings and Furnishings Report by simplifying the CTAs in such a way that the only difference between like items listed in the CTA is the corresponding price of the item that the installation managers have on hand. For example, if installation managers had two different types of twin bed mattresses, the manager would list "Bed Mattress" twice in the report. The only identifiable difference between the two mattresses would be the price the manager inputs into the report.

Table 2 shows the CTA for the UPH in a CONUS location:

TABLE 2- CTA for UPH in a CONUS Installation

TYPE-UPH CONUS	LIN	NOMENCLATURE
Enlisted Quarters: UPH	11207N	FOOSBALL TABLE
Enlisted Quarters: UPH	80567N	BEDSPREAD, SOLID COLOR 76W X 113L IN
Enlisted Quarters: UPH	80655N	BOX SPRINGS, DOUBLE 54 W X 75 IN L
Enlisted Quarters: UPH	81196N	COVER MATTRESS, COTTON SHEETING ENVELOPE TYPE SIZE DOUBLE
Enlisted Quarters: UPH	81225N	COVER MATTRESS, 82" X 37-1/2" X 6-1/2"
Enlisted Quarters: UPH	85892N	PAD MATTRESS, COTTON QUILTED WHITE 80L 38W IN
Enlisted Quarters: UPH	87286N	SHEET BED, COTTON POLYESTER WHITE DOUBLE
Enlisted Quarters: UPH	90862N	BENCH CUBE, PARTICLE BOARD T/S PLASTIC LAM WHITE 60W 18D 18H IN
Enlisted Quarters: UPH	90881N	BED, DOUBLE W/HEADBOARD FOOTBOARD AND FRAME 54 W X 75"L
Enlisted Quarters: UPH	90933N	BED BUNK, STL OR ALUM FRAME
Enlisted Quarters: UPH	91207N	CUSHION RUG SPONGE RUBBER FIRM
Enlisted Quarters: UPH	91657N	CARPET (WHEN CLASSIFIED AS EQUIPMENT-IN-PLACE)
Enlisted Quarters: UPH	91658N	CUSHION CARPET SPONGE RUBBER FIRM
Enlisted Quarters: UPH	91669N	CHAIR LOUNGE
Enlisted Quarters: UPH	91877N	CHEST, 3-DRAWER METAL OAK CHAMPAGNE SIDES AND BACK
Enlisted Quarters: UPH	92122N	DRAPERIES
Enlisted Quarters: UPH	92406N	DISHWASHER PORTABLE
Enlisted Quarters: UPH	92408N	DECORATIVE ACCESSORIES, PAINTINGS OR OTHER WALL ART
Enlisted Quarters: UPH	92501N	DESK, QUARTERS W/WO DRAWERS/SHELVES
Enlisted Quarters: UPH	92544N	DESK FLAT TOP, WOOD SINGLE STYLE
Enlisted Quarters: UPH	93293N	FROZEN FOOD CABINET MECHANICALLY REFRIGERATED, 12 TO 15 CU FT CAP
Enlisted Quarters: UPH	94942N	LIGHT FLOOR, CHROME FINISH IRON BASE W/SWITCH
Enlisted Quarters: UPH	95135N	MACHINE CUE TIP REPAIR
Enlisted Quarters: UPH	96147N	OVEN MICROWAVE, COMMERCIAL TYPE
Enlisted Quarters: UPH	96534N	POOL TABLE, EQUIP W/AUTO BALL RETURN WITH BILLIARD TABLE ADAPTER
Enlisted Quarters: UPH	97020N	RACK, TRACT METAL OR WOOD
Enlisted Quarters: UPH	97045N	RUG, SIZED
Enlisted Quarters: UPH	97082N	RADIO (WITH OR WITHOUT PHONOGRAPH)
Enlisted Quarters: UPH	97208N	ROD, DRAPERY TRAVERSE TYPE
Enlisted Quarters: UPH	97337N	RANGE ELECTRIC, SELF-CLEANING 30 IN DOMESTIC SLIDE-IN
Enlisted Quarters: UPH	97338N	RANGE GAS, SELF-CLEANING 30 IN SLIDE-IN W/FOUR HEAT UNITS ONE OVEN
Enlisted Quarters: UPH	97339N	RANGE ELECTRIC, SELF-CLEANING FOR DOMESTIC USE W/COMPONENTS
Enlisted Quarters: UPH	97340N	RANGE GAS, SELF-CLEANING 30 IN W W/FOUR HEAT UNITS ONE OVEN
Enlisted Quarters: UPH	97362N	RUG, UNCUT PILE ACRYLIC W/ATTACHED RUBBERBACK
Enlisted Quarters: UPH	97942N	STAND TELEVISION
Enlisted Quarters: UPH	98463N	STAND SMOKING, BRONZE FIN METAL TAPE COLUMN 20H DIA ASH TRAY 8
Enlisted Quarters: UPH	98568N	STAND OVEN MICROWAVE MATERIAL TYPE SIZE AA
Enlisted Quarters: UPH	98807N	TELEVISION RECEIVER HOME, ANT AND ACCESSORIES COLOR OR BLK/WHT
Enlisted Quarters: UPH	98993N	TABLE ROUND, SPIDER CHROME FINISH BASE PLASTIC TOP BRN VINYL EDGE
Enlisted Quarters: UPH	98995N	TABLE UTILITY, SIZE AND TYPE AS SPACE PERMITS
Enlisted Quarters: UPH	99246N	TABLE, SPIDER CHROME FINISH BASE PLASTIC TOP BRN VINYL EDGE
Enlisted Quarters: UPH	99250N	TABLE, SQUARE WITH HINGED TOP SPIDER BASE 36 X 36 IN
Enlisted Quarters: UPH	99651N	VIDEOCASSETTE PLAYER
Enlisted Quarters: UPH	B72225	BLANKET BED: WOOL OLIVE GREEN
Enlisted Quarters: UPH	C58663	CUSHION: USE W/BENCH TABLE OCCASIONAL
Enlisted Quarters: UPH	N36710	OVEN MICROWAVE: ELEC COUNTER MTD 40W 31 D 34H

Table 2 shows an itemized list that installation managers can use to fill out their Housing and Furnishings Report. Table 3 represents a proposed simplification of the current CTA for UPH in a CONUS location. This simplified table for UPH in a CONUS location can be called the "HFR Listing-UPHC". (NOTE: The HFR Listing for UPH/AFH in a CONUS/OCONUS location should also have appliances listed) Installation managers are required to list items not specified in the HFR Listing-UPHC in the miscellaneous items section (Part I, Section C and Part II) of the Housing and Furnishings Report.

TABLE 3- Example HFR Listing-UPHC

TYPE- UPH CONUS	PRICE	NOMENCLATURE
Enlisted Quarters: UPH		BED
Enlisted Quarters: UPH		MATTRESS TWIN
Enlisted Quarters: UPH		CHAIR DESK
Enlisted Quarters: UPH		DESK
Enlisted Quarters: UPH		CHEST OF DRAWERS
Enlisted Quarters: UPH		LAMP
Enlisted Quarters: UPH		MIRROR
Enlisted Quarters: UPH		NIGHTSTAND
Enlisted Quarters: UPH		WARDROBE
Enlisted Quarters: UPH		UNDERBED
Enlisted Quarters: UPH		TV STAND
Enlisted Quarters: UPH		LINEN
Enlisted Quarters: UPH		TABLE
Enlisted Quarters: UPH		DRAPERIES

Again, the *only* description of items installation managers can use to fill out the Housing and Furnishings Report is given in the appropriate HFR Listing. The HFR Listing provides the installation managers the specific terminology that needs to be used when filling out Section I, Part B and Section II of the Housing and Furnishings Report. Additionally, if installation managers have more than one type of the item listed in the

appropriate HFR Listing, managers are required to enter that item twice into the report. IMCOM will use the price column to differentiate between the duplicate listings. It is strongly recommended that IMCOM use the example HFR Listing-UPHC and create similar itemized listings for UPH and AFH in OCONUS locations. The newly created lists should be labeled as:1) HFR Listing- UPHOC and 2) HFR Listing- AFHOC. These two additional listings should be improved simplifications of the CTAs for UPH and AFH in OCONUS installations. (Appendix D presents some examples of the CTAs for OCONUS UPH and AFH)

It is also recommended that IMCOM use the HFR Listing from CONUS installations as the baseline for UPH in OCONUS installations. For example, UPH in OCONUS locations should have the same basic items as UPH in CONUS locations. IMCOM should make only minor changes to HFR Listing-UPHC when it adopts its final version of the HFR Listing-UPHOC. It is acceptable if IMCOM determines that the CTA for a particular region is appropriate; however, the CTA must use the same descriptions as the HFR Listings and managers are still required to follow the same standard reporting procedures. One alternative to simplify this process is to make installation managers in OCONUS locations list any OCONUS (even region specific i.e., Korea, Germany, Alaska, etc.) specific items in the miscellaneous portion of the Housing and Furnishings Report. There are many alternative ways for IMCOM to solve this problem. However, it is imperative that there is standardization of reporting procedures and data collection across all of the installations. Once IMCOM provides the installation managers with the

appropriate HFR Listing, they will then have the proper description they need to properly input their items into the Housing and Furnishings Report.

In addition to the HFR Listings, IMCOM must also make some changes to the data columns it requires in the Housing and Furnishings Report. Specifically, IMCOM needs to add more columns to gather additional data that is required to conduct further detailed analysis. The new data columns are specifically needed for the EOQ Model; however, this data can also be used as data input for other models available in the Army LSS Program. Table 4shows the proposed changes to the Housing and Furnishings Report (the changes are specific to Part I, Section C of the report):

TABLE 4- UPDATED HOUSING AND FURNISHINGS REPORT (IMPROVEMENTS TO DATA COLLECTION)

PART 1 - SECTION C - CURRENT INVENTORY STATUS									
			Inventroy			Deficit			
#	Item Name	$Cost	Q'ty	$ Value	Program Level	Q'ty	$ Value	Avg. Demand Lead Time (Days)	Contract or Lease
	a	*b*	*c*	*d*	*E*	*f*	*g*	*k*	*l*
	Furniture								
1	Item Name from HFR Listing			$0		0	$0	Days	
2				$0		0	$0		
3				$0		0	$0		
4				$0		0	$0		
5				$0		0	$0		

PART 1 - SECTION C - CURRENT INVENTORY STATUS									
#	Item Name	Holding Cost	Excess	In Use Excess	Avg. Yearly Demand	Deviation Yearly Demand	Avg. Daily Demand	Deviation Daily Demand	Ordering/Setup Cost
	a	*h*	*i*	*j*	*K*	*l*	*m*	*n*	*o*
	Furniture								
1	Item Name from HFR Listing	$	0	Units	Units	Units/ year	Units	Units/ day	$
2			0						
3			0						
4			0						
5			0						

In order for the installation managers to input the correct data into the Housings and Furnishings Report, the installation managers must understand what exactly is required in each of the columns. Table 5 provides installation managers with a detailed description for each of the columns in the report. Table 5 also provides some recommendations if no baseline data values are available. At a minimum, all of the data fields should be filled out with the installation managers' best estimation of the value.

TABLE 5- DESCRIPTION OF THE DATA COLUMNS IN HOUSING AND FURNISHINGS REPORT

DATA INPUT COLUMN	DESCRIPTION OF VALUE NEEDED
Item Name	Specific naming convention used in the appropriate HFR Listing; if item is not mentioned, use the CTA for proper naming convention and annotate in the miscellaneous section
Cost	Cost per item in dollars ($); if multiple types of same item, list item more than once; cost is used by IMCOM to differentiate between the different types
Inventory Quantity	Total # of items on hand
Inventory Value	Inventory Quantity*Cost
Program Level	(Quantity authorized + maintenance float factor quantity)* Experience factor
Deficit Quantity	(Program Level) - (Inventory Quantity) - (Contract/Lease)
Deficit Value	Deficit Quantity*Cost
Average Demand Lead Time	Approx. # of days it takes to receive an item that is ordered from a higher echelon of support
Contract/ Lease	Total # of items that are on contract/ lease status
Holding Cost	Cost in dollars ($) per year; if holding cost is only in items that are stored in on-hand inventory, assume h=ic, where i is equal to annual interest rate and c is cost; if i is not available, assume i=.1
Excess	Program Level) - (Inventory Quantity)
In Use Excess	Total # of Excess items in use
Average Yearly Demand	Demand rate in items per year; if not available use an average of the number of items ordered in the previous FYs
Deviation (Yearly Demand)	Approx. observed deviation in the Avg. Yearly Demand
Average Daily Demand	Demand rate in items per day; if not available estimate nuimber based on demand per day in the previous 90 days
Deviation (Daily Demand)	Approx. observed deviation in the Avg. Daily Demand
Ordering/ Setup Cost	Cost in dollars ($) to place an order; if number is not available contact installation

NOTE: Data inputs for both demands and deviations are recommended, however only one demand value and its deviation are needed. Please input the more precise calculation/approximation

Now that the Updated Housing and Furnishings Report contains the proper data inputs, the EOQ Model can be used to determine the optimum order quantity Q for any particular item. Equation 1 is the EOQ Model. The variables in the EOQ Model are input data values from the Updated Housings and Furnishings Report: (1) A= Ordering/ Setup Cost (Column *o*), (2) D= demand rate in units per year (Column *k*; if demand rate is only provided in units per day, multiply value by 365), and (3) h= holding cost in dollars per unit per year (Column *h*).

$$Q = \sqrt{\frac{2AD}{h}}$$

(1)

Assuming that the installation managers have properly filled out the Updated Housings and Furnishings Report, determining the optimal order quantity Q is now a simple calculation. Table 6 shows a set of sample data from an installation. Equation 1 has been input into the excel file and the optimal Q value has already been calculated.

TABLE 6- EXAMPLE CALCULATIONS FOR EOQ MODEL

PART 1 - SECTION C - CURRENT INVENTORY STATUS									
#	Item Name	$Cost	Inventroy		Program Level	Deficit		Avg. Demand Lead Time (Days)	Contract or Lease
			Q'ty	$ Value		Q'ty	$ Value		
	a	*b*	*c*	*d*	*E*	*F*	*g*	*k*	*l*
	Furniture								
1	MATTRESS TWIN	109.25	7,994	873,345	7,864	-130	-14,203	60	0
2									

PART 1 - SECTION C - CURRENT INVENTORY STATUS									
#	Item Name	Holding Cost	Excess	In Use Excess	Avg. Yearly Demand	Deviation (Yearly Demand)	Avg. Daily Demand	Deviation (Daily Demand)	Ordering/Setup Cost
	a	*h*	*i*	*j*	*K*	*L*	*m*	*n*	*o*
	Furniture								
1	MATTRESS TWIN	11	130	0	1,398	1,292	N/A	N/A	5,000
2									
	OPTIMAL ORDER QUANTITY	1131							
	OPTIMAL ORDER INTERVAL		0.809	9.71	295				

Based on the sample data in Table 6, the optimal order quantity Q is approximately 1131. This means that inventory managers should order lot sizes of 1131 mattresses in order to fulfill the derivations from the EOQ Model. In addition to providing an optimal order quantity, the EOQ Model also has the potential to give installation managers an insight into the optimal order interval for each item. The time T between orders can be expressed by Equation 2.

$$T = \frac{Q}{D} \tag{2}$$

If Equation 1 is divided by D (Similar to the relationship shown in Equation 2) then Equation 3 provides the expression for the optimal order interval.

$$T^* = \sqrt{\frac{2A}{hD}} \tag{3}$$

In Table 6, the optimal order interval is given as the following three values: 1) .809 years, or 2) 9.71 months, or 3) 295 days. Based on the EOQ Model and the input data in Table 6, the installation managers should place an order for 1131 mattresses every 295 days.

If installation managers use the EOQ Model to help improve the Furnishings Management Process, each individual item must be analyzed independent from any other item. In addition, the values derived from the EOQ Model are specific to the input data

from its corresponding installation; they can not be used with any degree of reliability to predict the values at a different installation. IMCOM has the ability to compare the optimal Q values from all of the installations and in conjunction with other models in the Army's LSS Program, accurately forecast future demands and order quantities. IMCOM also has the ability to use the data from the Updated Housing and Furnishings Report to gain additional insight on the lifecycles and performance of the individual items in the report.

The EOQ Model is a powerful tool for managers to use, however it does have several limitations. First, it assumes that demand is constant over time. When analyzing UPH and AFH demand rates, it is certain that the demand rate varies over time. As a result, the EOQ Model is at best an approximate model to use to determine the optimal value of Q. In addition, the EOQ Model does not have the ability to incorporate the demand lead times into its analysis. It assumes that delivery is immediate and that production is instantaneous. Due to these limitations, the (Q,r) Model may be a more appropriate model, at some installations, to use in order to improve the Furnishings Management Process.

IMPROVE- THE HADLEY AND WHITIN (Q,r) MODEL

Since the development of the EOQ Model, researchers have continually attempted to develop and model inventory control systems under various parameters and underlying assumptions. This research has been performed in an attempt to improve the overall efficiency of businesses and companies, while simultaneously trying to understand: 1) how the variables associated with inventory are changing and 2) how to better improve the methods that are currently being used to predict certain desired outcomes. One of the most common research endeavors focuses on the trade-off between ordering, holding and shortage costs. Specifically, researchers are concerned with finding the optimum levels of quantity (Q) needed in an inventory system as well as the reorder point (r) for future inventory. These models are commonly referred to as (Q,r) models and are essential in accurately forecasting the inventory needed for numerous businesses and companies.

Inventory control is one of the most difficult tasks faced by businesses and companies in today's modern global supply chain. There are many models and heuristics that try and solve these problems in order to improve the overall efficiency of these companies. There are two primary ways that inventory is managed: 1) Inventory is either viewed periodically in well defined time cycles or 2) Inventory is viewed continuously (infinite time horizon) and models are updated as new information becomes available. One of the most common models used during continuous review is the (Q,r) Model. The (Q,r) Model determines the optimal levels of quantity (Q) that need to be ordered as well as the reorder point (r) for a given set of parameters. Furthermore, current models and heuristics also vary in the number of items they wish to analyze. Some models and

heuristics choose to analyze a single item, while others choose to explore the challenges associated with multi-item problems.

A (Q,r) Model that could be used to improve the Furnishings Management Process is the iterative (Q,r) approximation derived by Hadley and Whitin. This model is a single item model that is continuously reviewed (infinite time horizon) to find the optimal levels of Q and r for a given set of data. Additionally, the stochastic lead-time demand can vary throughout the model and different standard deviations and distributions can be used to model various conditions.

In 2000, Geunes, Ramasesh and Hayya (GR&H) developed a (Q,r) Model heuristic based on the Harris EOQ formula and the "critical-fractile" from the newsvendor or newsboy problem. GR&H use these two equations in their heuristic to determine various levels of Q and r and compare their results to the iterative (Q,r) approximation developed by Hadley and Whitin in the 1960s. GR&H's heuristic is a "simple, easy-to-implement and flexible" policy that is designed to be used in "infinite-horizon [problems with] stochastic lead-time demand inventory systems in which parameters may be non-stationary." In contrast, Hadley and Whitin's iterative approximation was originally intended for systems with a stationary mean demand rate. GR&H state in their paper that the Hadley and Whitin approximation is too difficult to understand and too complicated to use in practice (GRH, 2001). However, in a separate paper by Hing, Lau, and Lau (2002), these researchers argue that the Hadley and Whitin iterative (Q,r) approximation is more robust and useful than previously thought, and

contrary to GR&H, the iterative (Q,r) process can used in scenarios where there is a varying mean demand rate as long as the process is recalculated.

In order to prove that the Hadley and Whitin iterative (Q,r) approximation is an appropriate model to use to improve the Furnishings Management Process, the results from the GR&H research paper were replicated in order to test and verify the computational process. Once this verification process was completed, the Hadley and Whitin iterative (Q,r) approximation was compared to the GR&H heuristic in the following scenarios: 1) Large changes to the standard deviation for the annual demand as well as changes to the lead-time demand; 2) Changes in demand lead-time and 3) Changes in the demand (Normal vs. Negative Binomial). (While the detailed analysis of these comparisons is beyond the scope of this report, it is available from the author of this report upon request.)

The primary reason to examine these three scenarios was because they closely replicate what happens during the UPH and AFH procurement process. As was observed throughout the installation's data, it is not uncommon to find large standard deviations for the annual demand rate per item at an installation nor is it uncommon for there to be changes in the demand lead-time. Lastly, forcing a comparison between two different demand distributions is a good way to model the constantly changing populations at any given installation. Lastly, the only case that was considered during this comparison process was the backorders case. The lost sales case was not considered because it does not accurately reflect any situation faced by the Furnishings Management Process. For example, if a customer goes to an installation to get a specific item that is not in stock, it

is safe to assume that the demand for the item is not lost to the organization. However, it is safe to assume that as the customer's dissatisfaction increases, the backordering charge will also increase. Additionally, if any installation manager wishes to implement the lost sales case in their inventory management process, the data inputs already obtained from the Updated Housing and Furnishings Report provide the necessary information.

The comparison between the GR&H heuristic (Q,r) Model and the Hadley and Whitin (Q,r) Model showed that Hadley and Whitin was a superior model when the holding cost was greater than the backorder cost, the setup cost was low and the demand lead-time was greater than 8 days. Although, those conditions do not normally present themselves in the business community, they are very close descriptions of some of the conditions that the Furnishings and Management Process operates in, specifically in OCONUS installations. The Hadley and Whitin iterative (Q,r) approximation Model is an ideal model to use to improve the Furnishings and Management Process. It is an excellent model for determining optimal local inventory levels, optimal reorder points, as well as optimal service stock levels for any particular items. The previous conclusions mentioned in this section provide installation managers the initial conditions where the Hadley and Whitin iterative (Q,r) approximation Model is a superior model to use for inventory management. (While the detailed analysis of these comparisons is beyond the scope of this report, it is available from the author of this report upon request.)

The Hadley and Whitin iterative (Q,r) approximation Model is an excellent model that can be used to improve the Furnishings Management Process. Once installation managers fully understand its processes and capabilities, they will have a deeper

understanding of the entire inventory management process. Although the Hadley and Whitin (Q,r) Model has some limitations, it is an excellent starting point for almost any inventory problem that an installation manager may face.

CONTROL

The Furnishings Management Process is currently an unsustainable process that the Army must change in order to maintain its long-term viability. The most effective change that can immediately be made is standardization. Standardization in the short-term refers to the ability of installation managers to accurately provide IMCOM with the necessary data to conduct analysis and recommend possible improvements to the current process. Standardization is the key to identifying shortcomings in the current process as well as generating changes for success in the future. Standardization in the long-term refers to the ability of IMCOM to develop new changes to the Furnishings Management Process that will transform it into a process that will manage all of the Army's furnishings in a fiscally responsible manner. Standardization in the management process will eventually minimize the variance within the system and allow managers to accurately forecast all of the changes and requirements as they pertain to furnishings.

Right now it is imperative that installation managers look at the Furnishings Management System that is used at their respective installation and do their best to understand it completely. It is critical that managers focus on all of the moving elements within their system and develop the best way possible to manage all of their respective variabilities. In the end, it is going to be their ability to accurately describe their current situation as it relates to furnishings as well as their ability to forecast the future requirements that are going to help IMCOM make the necessary changes to improve the overall system.

CONCLUSION

The Furnishings Management Process as it relates to UPH and AFH is a process that is important to the success of Soldiers throughout the Army. For a long period of time, the Army has been so focused on improving the quality of service throughout all of its installations in other arenas that it has overlooked the fiscal responsibility of maintaining a highly efficient Furnishings Management Process. By utilizing the power of the Lean Six Sigma Methodology, the Army is currently transforming its Furnishings Management Process into a program that will meet all of its obligations while simultaneously maintaining the highest efficiency standards. Due to the large, complex nature of this particular project, various obstacles have presented themselves; however, they have not stopped the necessary changes from taking place. As standardization is increased throughout all of the installations, CONUS and OCONUS, the variabilities that exist throughout the system will eventually approach their smallest possible values. Ultimately this will lead to a meaningful analysis that will provide the necessary recommendations needed for success. Although, this paper has not solved the problem, it is an important stepping stone in the road to transformation and long-term sustainability.

Once all of the installation managers comply with all of the new guidance and recommendations in this report, further analysis should be conducted and the process should continue to be improved.

APPENDIX A
HOUSING AND FURNISHINGS REPORT

HOUSING FURNISHINGS REPORT

TO OPORD 11-579

TO:
IMCOM HQ
For LSS Project
Numbers: 18698, 18773, and 19292

FROM *(Include office symbol)*

REAL PROPERTY INVENTORY CODE *(RPIC)*

POC

AFH ☐ UPH ☐

REPORT DATE

PART 1 - SECTION A - CURRENT INVENTORY

1 TOTAL HOUSING - FURNISHINGS SUPPORT

a. NO. OF ON/OFF POST UNITS SUPPORTED _____ b. NO. OF BEDROOMS

2 PRIVATELY - LEASED HOUSING - FURNISHINGS SUPPORT

a. NO. OF ELIGIBLES _____ b. NO. ACTUALLY SUPPORTED _____ c. NO. OF BEDROOMS

3 GOVERNMENT - CONTROLLED FAMILY HOUSING DWELLING UNITS SUPPORTED WITH FURNISHINGS

a. NO. OF DWELLING UNITS _____ b. NO. OF BEDROOMS _____ (On Post)
c. NO. OF DWELLING UNITS _____ d. NO. OF BEDROOMS _____ (Off Post)

e. NO. OF SPECIAL COMMAND UNITS _____ f. NO. OF BEDROOMS
g. NO. OF FOREIGN EXCHANGE UNITS _____ h. NO. OF BEDROOMS
i. NO. OF STUDENT/SHORT-TOUR UNITS _____ j. NO. OF BEDROOMS

4 GOVERNMENT - CONTROLLED UPH SPACES SUPPORTED WITH FURNISHINGS

a. NO. OF SPACES SUPPORTED _____
b. NO. OF 1-PERSON ROOMS/BEDROOMS _____
c. NO. OF 2-PERSON ROOMS _____
d. NO. OF 3-PERSON ROOMS _____

e. NO. OF 4-PERSON ROOMS _____
f. NO. OF OPEN BAYS _____
g. NO. OF SPACES IN OPEN BAYS _____
h. NO. OF LOUNGES _____

i. NO. OF KITCHENS _____
j. NO. OF DAYROOMS _____
k. NO. OF TELEVISION _____
l. NO. OF VISITOR'S LOUNGES _____
m. NO. OF LIVING ROOMS

5 **PART 1 - SECTION B - ANNUAL OPERATING BUDGET DATA (Round to nearest $(000))**

LINE	COST ACCOUNT	PROGRAM ELEMENT	COST PRIOR YEAR	CURRENT YEAR	BUDGET YEAR PLAN	BUDGET YEAR UNFINANCED	FY__	FY__	FY__	FY__	
	a	*b*		*c*	*d*	*e*	*f*	*g*	*h*	*i*	
1	Initial Issue - Furniture										
2	Initial Issue - Appliance/Equipment										
3	Total Initial Issue	0	$0	0	0		0	0	0	0	
4	Replacement Furniture										
5	Replacement Appliance/Equipment										
6	Maint/Repair Furniture										
7	Maint/Repair Appliance/Equipment										
8	Moving and Handling										

6 **PART 1 - SECTION B - ANNUAL OPERATING BUDGET DATA (Round to nearest $(000))**

LINE	ITEM	EXCESS	IN USE EXCESS	AVAILABLE FOR REDISTRIBUTION
	a	*b*	*c*	*d*
9	Furniture			
10	Appliance/Equipment			
11	Under Contract or Lease			

APPENDIX A (CONTINUED)
HOUSING AND FURNISHINGS REPORT

ORIGINATOR'S OFFICE SYMBOL: 0 ☐ AFH ☐ UPH

PART 1 - SECTION C - CURRENT INVENTORY STATUS

LINE	ITEM NAME	AVERAGE COST	INVENTORY		PROGRAM LEVEL =(Qty authorized + maintenance float factor qty) x experience factor	DEFICIT		EXCESS	IN USE EXCESS	AVAILABLE FOR REDISTRIBUTION	UNDER CONTRACT OR LEASE
			QTY	$ VALUE		QTY	$ VALUE				
	a	*b*	*c*	*d*	*e*	*f*	*g*	*h*	*i*	*j*	*k*
	Furniture										
1			0	$0	0	0	$0	0			0
2				$0		0	$0	0			
3				$0		0	$0	0			
4				$0		0	$0	0			
5				$0		0	$0	0			
6				$0		0	$0	0			
7				$0		0	$0	0			
8				$0		0	$0	0			
	Misc., Items										
9				$0		0	$0	0			
10				$0		0	$0	0			
11				$0		0	$0	0			
12				$0		0	$0	0			
13				$0		0	$0	0	☐ ☐		
14				$0		0	$0	0			
15				$0		0	$0	0			
16				$0		0	$0	0			
	TOTAL FURNITURE		**0**	**$0**	**0**	**0**	**$0**	**0**	**0**	**0**	**0**
	Appliances										
17				$0		0	$0	0			
18				$0		0	$0	0			
19				$0		0	$0	0			
20				$0		0	$0	0			
21				$0		0	$0	0			
22				$0		0	$0	0			
23				$0		0	$0	0			
24				$0		0	$0	0			
	TOTAL APPLIANCES		**0**	**$0**	**0**	**0**	**$0**	**0**	☐ **0** ☐	**0**	**0**
	TOTAL FURNITURE & APPLIANCES		**0**	**$0**	**0**	**0**	**$0**	**0**	**0**	**0**	**0**

PART 1 - SECTION D - REMARKS

APPENDIX B
REPLACEMENT/ INITIAL ISSUE COST SHEET

Replacement/Initial Issue Cost Sheet (To OPORD 11-579)					
UPH	AFH	**REPLACEMENT / INITIAL ISSUE COST SHEET**			
GFOQ		**REPLACEMENT FURNISHINGS**			
Garrison	FY	Furniture Funding Requirement	Garrison Funded	Huntville Funded/Savings $$	Total
	FY06				
	FY07				
	FY08				
	FY09				
	FY10				
	FY11				
		INITIAL ISSUE FURNISHINGS			
Garrison	FY	Furniture Funding Requirement	Garrison Funded	Huntville Funded/Savings $$	Total
	FY06				
	FY07				
	FY08				
	FY09				
	FY10				
	FY11				

Instructions: Fill out separate spreadsheet for each type of furniture at each Garrison.
(Check only one box for each type of furniture.)

APPENDIX C
SURVEY QUESTIONS

SURVEY QUESTIONS to Operations Order 11-579: Housing Furnishings Data for Select Installations (U)

1. Are furnishing funds obligated against the correct Army Program Element (APE)?

2. Are fixtures and real property being purchased as furnishings (incorrect APE); mini blinds, installed stove tops or microwaves, etc?

3. Are housing furnishings located in unit company/battalion/brigade and other installation administrative offices (couches, tables, refrigerators, and microwaves)?
3a. If so, how are they accounted for on hand receipts?
3b. How often are the hand receipts updated?

4. Is the UPH account reimbursed?

5. Are excess serviceable furnishings being reported to HQ IMCOM, IMCOM Regions, for cross leveling to other installations?

6. Does UPH furnishings on-hand comply with the "GSA Furnishings (Quality) Specifications" for UPH furnishings?
6a. Are they purchased through the USACE, Huntsville Centralized Furnishings Program?
6b. If not purchased through the Huntsville Program how do you purchase your furnishings and from whom?

7. Is there a furnishing plan for GFOQ furnishings and are the furnishings maintained by quarters address with costs, to include Privatized Housing?

8. Are operational supplies charged to the operations APE and not to the actual mission furnishings APE which are placed in UPH housing?

9. Is there a technically inspected (TI) system in place for furnishings prior to disposal to ensure serviceable furnishings requiring minor adjustments are not unnecessarily sent to the Defense Reutilization Marketing Office (DRMO)?

10. Are all furnishings being turned-in through DRMO?
10a. If not, where are they being turned-in?
10b. How does Garrison communicate with DRMO?
10c. Are lists or projections provided to DRMO so that DRMO can plan and budget?
10d. Is DRMO responsive and timely? If not, please provide a description of the issues.

APPENDIX C (CONTINUED)
SURVEY QUESTIONS

11. Are furnishings left in buildings scheduled to be demolished or renovated?
11a. If so, under who's authority?
11b. If furnishings were disposed by demolition or renovation provide 1348s showing DRMO's approval.

12. Provide copies of your DD Forms 1348 turn-in documents (manual or system generated; HOMES, eMH, or other) for FY06 thru FY11.

13. For whatever reason, are serviceable furnishings being turned into DRMO in lieu of warehousing (for example, expensive equipment like microwaves and refrigerators)?
13a. Why are you doing this (a lack of manpower or a lack of warehouse space, for example).

14. Is there adequate warehouse space?

15. Does the facility have back logged service / work orders (i.e. leaking roofs).

16. Is material handling equipment adequate? (i.e. pallet jacks, forklifts?)

17. For barracks furniture, E-1 to E-4, what is your rule-of-thumb cost per soldier per space for furnishings?

18. Describe any furnishings repair activity you normally perform.
18a. For the furnishings you have: are they assembled by components that can easily be interchanged and "cannibalized" for repairs?
18b. How do you account for and dispose of furnishings you cannibalize?
18c. What percentage of furniture in service has been repaired? (Please estimate if you have no hard data.)
18d. Who performs repairs and what are their job titles?

19. What local policies do you have governing loaner furniture, for example: eligibility, and duration of loan?

20. For your population served: what proportion are civilians, both accompanied and unaccompanied?

APPENDIX D
UFH AND AFH OCONUS CTAs

KOREA-AFH CTA

Stand Issue of AFH Furnishings and Appliance Sets			
Item Description	3 Bedroom	4 Bedroom	5 Bedroom
Headboard W/frame, Queen	1	1	1
Bedspring, Queen	1	1	1
Bedspring, Queen	1	1	1
Bunk Bed (1/2)	2	3	4
Matress, Extra long (single)	2	3	4
Chair, desk	2	3	4
Chair, Dining, w/ arms	2	2	2
Chair, Dining, w/o arms	4	4	5
Chair easy	2	2	3
Chest of 5 drawer	1	1	1
Desk student	2	3	4
Dresser of 6 drawer	3	4	5
Lamp Table (light)	6	7	8
Mirror (tri fold)	1	1	1
Mirror (double)	2	3	4
Sofa 3 Seat	1	1	1
Table Coffee	1	1	1
Table End	2	2	2
Table Dining	1	1	1
Table Night	4	5	6
Dryer (elect or gas)	1	1	1
Range (elect or gas, 30")	1	1	1
Refrigerator 21CF	1	1	1
Washer	1	1	1
Entertainment Center (family room only)	0	0	1

KOREA-UPH CTA

Stand Issue of Off Post UPH Furnishings and Appliance Sets			Stand Issue of Off Post UPH Furnishings and Appliance Sets	
Item Description	Qty		Item Description	Qty
Headboard W/frame, Double	1		Table End	1
Bedspring, Double	1		Table Lamp	1
Bedspring, Double	1		Bookcase	1
Mirror	1		Table Dining	1
Chest of 6 Drawer	1		Chair Dining	2
Chest of 3 Drawer	1		Range	1
Lamp Table (light)	1		Refrigerator	1
Sofa 2 seat	1		Washer	2
Easy Chair	1		Dryer (elect or gas)	1
Table Coffee	1			

APPENDIX D (CONTINUED)
UFH AND AFH OCONUS CTAs

EUROPE- AFH CTA

QTY.	Furnishings Item		Authorization		
	Bed, Double: Slat		1 Per Dwelling		
	Mattress, Double: HDFM		1 Per Dwelling		
	Cover, Mattress: Dbl		1 Per Dwelling		
	Bed, Single: Slat		1 Per Dependent without Spouse		
	Mattress, Single: HDFM		1 Per Dependent without Spouse		
	Cover, Mattress: Sgl		1 Per Dependent without Spouse		
	Cabinet Kitchen	Permanent Issue	3 Pieces 1-door kitchen cabinets per apartment **		
	Chair, Dining: w/o Arms		Minimum 4 per dining table depending on family size		
	Chair, Easy		2 Per Dwelling		
	Chest or Dresser ***		1 Per Family Member but not more than 3 pieces		
	Sofa, 3 Seat		1 Per Dwelling		
	Table, Coffee		1 Per Dwelling		
	Table, Dining		1 Per Dwelling		
	Table, End		2 Per Dwelling		
	Table, Night		1 Per Family Member or Authorized Individual		
	Wardrobe	Permanent Issue	1 Per Individual + 1 Per Household **		
	Range	Permanent Issue	1 Per Dwelling		
	Refrigerator	Permanent Issue	1 Per Dwelling		
	Dishwasher	Permanent Issue	1 Per Dwelling		
	Washing Machine	Permanent Issue	1 Per Dwelling	US or EURO	
	Dryer	Permanent Issue	1 Per Dwelling	US or EURO	

EUROPE- UPH CTA

Furnishings Item	BKS UPH	NCO UPH	Offpost UPH	Furnishings Item	BKS UPH	NCO UPH	Offpost UPH
Bed, Double: Slat	0	1	1	Lamp, Table	1	2	2
Mattress, Double: HDFM	0	1	1	Mirror	1	1	1
Cover, Mattress: Dbl	0	1	1	Sofa (2 Seat)	0	1	1
Bed, Single: Platform, Slat, Stackable or Slat Stackable	1	0	0	Table Coffee	0	1	1
Mattress, Single: HDFM	1	0	0	Table Square	0	1	1
Cover, Mattress: Sgl	1	0	0	Table, End	0	1	1
Bookcase	0	1	1	Table, Night	1	1	1
Cabinet Kitchen	0	0	3	TV - Stand	1	1	1
Chair, Dining: w/o Arms	1	3	3	Wardrobe	2	2	2
Chair, Easy	0	1	1	Dryer	0	0	1
Chest 3 DR	1	2	2	Microwave	0	0	0
Dresser or a 6 drw. chest or two 3 drw. chests	0	1	1	Range 24"	0	0	1
Desk, Student	1	1	1	Refrigerator, 9.5	0	1	1
Washing Machine	0	0	1				

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